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ABSTRACT

This study examined earnings inequality for college and university faculty, using data from the National Study of Postsecondary Faculty to examine whether earnings for this group increased from the late 1980s to the late 1990s. The study was the first to decompose faculty earnings inequality into the proportion of the earnings inequality that is attributable to differences in earnings across institutions and the proportion of earnings inequality that is attributable to differences within institutions. It attempted to identify sources of the growing earnings inequality within institutions. Data analysis indicated that overall earnings inequality among college and university faculty increased from the late 1980s to late 1990s. This increase was the product of both increases in between-institutions earnings inequality, as well as to increases in within-institution earnings inequality, even conditional upon rank, tenure status, experience, seniority, gender race, citizenship, and field of specialization. Overall, the dispersion of earnings among observationally equivalent faculty has increased. (Contains 14 references.) (SM)

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Increasing Earnings Inequality in Faculty Labor Markets

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Increasing Earnings Inequality in Faculty Labor Markets

From the late 1980s to the late 1990s, U.S. college and university faculty experienced increasing earnings inequality. This rising dispersion in earnings is the result of both increasing earnings inequality between institutions, even within sectors of higher education, and within institutions, even conditional on rank, tenure status, demographic characteristics, and field of specialization. Existing studies that only examined between institution differences in average earnings underestimate both the level and increase in earnings inequality.

I. Introduction

From the 1970s through the 1990s the United States experienced a significant increase in earnings inequality. A number of studies have attempted to document the widening of the earnings distribution and to investigate the underlying causes of this trend (see Welch (2001), Gottschalk and Moffitt (1994), and Levy and Murnane (1992)). This widening earnings distribution has been the product of both increased earnings inequality across groups, such as college educated and high school educated workers, and increased earnings inequality within these groups.

This study examines earnings inequality for a narrow slice of this labor market --- college and university faculty. There are a number of reasons one might expect that faculty labor markets are immune to changes in the broader labor force. First, faculty tend to be highly educated, with most faculty holding a masters or doctoral degree. Increases in earnings ine quality may not be as pronounced within this small group of the labor force. Second, many faculty are employed by publicly controlled institutions. If earnings inequality is primarily a private sector phenomenon than the presence of such a large percentage of faculty employed by public institutions may act to restrain increases in earnings inequality. Third, and perhaps primarily, the tenure system in higher education may so significantly alter the employer-employee relationship that earnings in higher education do not always follow the patterns of the overall labor market. For example, the primary reward for performance in higher education is the granting of tenure, or job security, while in most labor markets the reward for performance comes in the form of higher earnings. As a result of the peculiarities of faculty labor markets one might expect that the increases in earnings inequality experienced in the overall labor force have not permeated the academic labor market.

On the other hand, there are reasons to believe that faculty labor markets have also undergone increases in earnings inequality. Because higher education has to compete for faculty with employers outside of academia, it may be the case that the growing disparity of opportunity costs among faculty has led to growing earnings inequality among faculty, as well. Additionally, there is preliminary evidence in the literature that there has been increased earnings inequality, at least in average earnings across institutions.

This study suggests that while these differences across institutions may be significant they overlook a substantial source of growing earnings inequality among faculty – increases in within institution earnings inequality. I use a national data set of faculty, rather than institution level data, to examine whether earnings for this group have increased from the late 1980s to the late 1990s. Additionally, this analysis is the first to decompose faculty earnings inequality into the proportion of the earnings inequality that is attributable to differences in earnings across institutions and the proportion of earnings inequality that is attributable to differences within institutions. Furthermore, this study attempts to identify the sources of the growing within institution earnings inequality.

In summary, I find that faculty earnings have in fact grown more disparate over time, and that this increasing inequality is the result of increases in both across and within group earnings inequality.

II. Literature Review

The existing studies that have examined growing inequality in earnings among faculty have relied on data from the American Association of University Professors (AAUP), which

reports institutional average faculty salaries by rank. Bell (1998) utilized the AAUP data to calculate the standard deviation of institutional average earnings for full professors. She found a general increase in the standard deviation of earnings for full professors, with the largest increases in the standard deviation of average salaries at private research and doctoral institutions (category I institutions in the AAUP definition). Similarly, Ehrenberg (2003a) finds growing earnings inequality in average earnings across both public and private institutions beginning in the 1970s. He attributes this growing inequality to increasing differences in endowment per student at private institutions, and increasing differences in state appropriations per student at public institutions. Bell (2000), in another AAUP report, took an alternative approach in using AAUP data to measure earnings inequality. She compared average earnings to median earnings over time. She found that average earnings were growing much more rapidly than median earnings, suggesting that the top tail of the earnings distribution was experiencing earnings increases that were significantly larger than those in the middle and bottom tail of the distribution.

A number of studies (Zoghi (2003), Alexander (2001), and Bell (2001)) utilized AAUP data to demonstrate the growing premium of earnings at private universities versus public universities. For example, Alexander (2001) found that average salaries were roughly comparable between public and private research and doctoral university faculty in 1980, but had separated since then. By 1998, full professors at private research I universities earned approximately 29 percent more than their counterparts at public research I universities.

This paper contributes to this literature by utilizing individual faculty level data, rather than institutional average data, to measure the level and increase in earnings inequality. The use of faculty level data allows one to control for detailed faculty characteristics such as rank,

institutional type, demographic characteristics, and field. Additionally, this paper provides the first decomposition of the variance of faculty earnings into the proportion of the variance attributable to differences in earnings across institutions and the proportion of the variance due to within institution differences in earnings.

III. The Data.

The data utilized for this analysis come from the National Study of Postsecondary Faculty (NSOPF; 1988, 1993, and 1999). These surveys of faculty provide nationally representative samples of faculty at three different points in time approximately 5 years apart. Because the surveys targeted slightly different populations of faculty, I limit the sample to full-time faculty with instructional duties, who are tenured or tenure-track, at four-year research, doctoral, comprehensive, and liberal arts institutions. The sample also excludes faculty in the health sciences (including medicine, dentistry, and veterinary medicine), as their salary structure is usually significantly different from those in the rest of academia. I also limit the sample to those who report their salary and whose reported real (in CPI-U adjusted 2001 dollars) basic salary from their institution is greater than $10,000 and less than $300,000. This last restriction will lower the variance of earnings, but will eliminate individuals whose salaries reflect only partial year employment, and prevents the results from being driven by a few unusually low or high reported salaries. Finally, I restrict the sample to those institutions that contain survey responses from 10 or more faculty members. This allows me to more accurately estimate both institutional average earnings and within institution variances in earnings. This restriction also lowers the estimated variance in earnings by disproportionately eliminating faculty from smaller

institutions. In summary, the sample restrictions are designed to make the samples consistent across survey years, and to conservatively estimate the level and trend in the variance of earnings; thus, by imposing these sample restrictions any subsequent increase in earnings inequality should represent a conservative estimate of the increase in the dispersion of earnings over time and should not be the product of sample construction.

The remaining sample contains 3,711 individuals and 192 institutions in 1988, 6,922 individuals and 389 institutions in 1993, and 3,981 individuals and 245 institutions 1999. All three surveys asked faculty to report their 'Basic Salary' from their institution for the preceding calendar year (1987, 1992, and 1998).[1] Table 1 presents average salaries by rank and institutional type from the samples used here compared to AAUP values.[2] Although the sample restrictions imposed here and the salary definitions (calendar versus academic year) are different, the average salaries across the two surveys are quite similar. In fact, the average salaries by rank and institutional type are usually within 4 percent of each other (with the exception of full professors at liberal arts colleges, 9.3 percent). A careful comparison of the NSOPF earnings data from the 1993 survey to AAUP data conducted by the National Center for Education Statistics concluded that the data are largely consistent and any discrepancies are primarily the product of differences in target populations and definitions.[3]

IV. Analysis

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[1] Calendar year salary was used rather than academic year salary in order to be consistent with the 1988 questionnaire which only asked about calendar year salary.
[2] All statistics are calculated using faculty sample weights.
[3] *1993 National Study of Postsecondary Faculty Methodology Report*, pg. 143.

I find that overall earnings inequality among full time instructional, tenured and tenure-track faculty at four-year institutions increased from the late 1980s to the late 1990s. This result is confirmed by a number of measures of inequality. From 1987 to 1998, average real salaries increased from $63,271 to $68,027 (in 2001 CPI-U adjusted dollars) or 7.52 percent, while median real salaries increased from $59,594 to $63,043, or 5.79 percent (see Table 2). Average earnings increased more rapidly than median earnings, consistent with the findings of Bell (2000), suggesting that earnings in the top tail of the income distribution are increasing more rapidly than those in the middle of the distribution.

To disentangle this result more finely, I calculate real earnings deciles across the three survey years. A common measure of earnings inequality is to calculate the earnings of the 90th percentile divided by the earnings of the 10th percentile – the 90/10 ratio. In 1987 an individual at the 90th percentile of the faculty earnings distribution would have made 2.27 times the earnings of an individual at the 10th percentile. By 1998, the individual at the 90th percentile would have made 2.50 times the individual at the 10th percentile. The 90/10 ratio increased over this 11 year period. An examination of the 10/50 ratio (the earnings of an individual at the 10th percentile divided by median earnings) reveals that individuals in the bottom tail of the distribution earned approximately two-thirds as much as the median earnings, in both 1987 and 1998. The 90/50 ratio, however, indicates that an individual at the 90th percentile earned 52 percent more than the median earnings in 1987 and 64 percent more than the median in 1998. The difference between the top tail of the earnings distribution and the middle of the distribution is growing wider.

This growing divergence between the top of the earnings distribution and the middle and bottom of the earnings distribution is illustrated in Figure 1. This figure shows the percentage

change in earnings, from 1987 to 1998, at each decile of the earnings distribution. Although real earnings at all points along the earnings distribution declined from 1987 to 1992, the greatest percentage decreases were among the bottom half of the earnings distribution. On the other hand, real earnings increased all along the earnings distribution from 1992 to 1998. The top half of the earnings distribution saw much greater increases in earnings than the bottom half of the distribution. The end result is that earnings at the 90^{th} and 80^{th} percentiles grew by 14 and 11 percent, respectively, while earnings in the bottom half of the distribution grew by 3 percent or less from 1987 to 1998.

Perhaps the most common measure of the dispersion of earnings is the variance of the natural log of earnings. Table 2 shows that the variance of the natural log of earnings increased by .042, from .105 to .147, or by 40% from the late 1980s to the late 1990s.[4] An F-test rejects the null hypothesis of the equality of the variances in 1998 versus 1987, at the 99 percent level (F-stat=1.4, p-value = .00001). In other words, an individual two standard deviations above (below) the mean in 1987 made approximately 65 percent more (less) than the average person ($2*(.105)^{.5}$), while an individual two standard deviations above the mean in 1998 made approximately 77 percent more than the average person ($2*(.147)^{.5}$).

A concern may be that with only three years of data this increase may simply be picking up cyclical effects rather than a trend. From 1987 to 1992 and then again from 1992 to 1998 the variance of earnings increased. To gauge the nature of faculty labor markets leading up to those years I use AAUP data to calculate the average percentage increase in real faculty salaries across all ranks and institutions in the 5 years preceding the NSOPF survey years (1979-80/1981-82 to

[4] This increase in the variance of earnings is found even without the restriction of ten or more faculty per institution (an increase of .03), and when matching institutions across survey years (an increase of .042), although this latter restriction dramatically decreases the number of institutions available especially among liberal arts and comprehensive institutions.

1986-87/1987-88; 1987-88/1988-99 to 1991-92/1992-93; and 1993-94/1994-95 to 1997-98/1998-99) The average annual percentage increase in real earnings in the 5 years preceding 1987-88 was 2.0 percent; the average annual percentage increase in real earnings in the 5 years preceding 1992-93 was .4 percent, and average annual percentage increase leading up to 1998-99 was .9 percent. The 3 year averages were 2.2 percent, .1 percent, and 1.5 percent, respectively. Based on average annual percentage increases in faculty salaries it appears that the most robust period was around 1987, with a period of stagnant earnings around 1992, and renewed but less vigorous growth prior to 1998. One might expect that the greatest inequality would occur during periods of rapid salary growth—this clearly was not the case. Despite the slow down in salary increases around 1992 and the moderate growth in real salaries around 1998 the variance of earnings increased in both years relative to 1987. It does not appear that the increase in the variance of earnings is simply a cyclical effect. This suggests that academic labor markets have not been immune to the forces of the broader labor market and its trend of increasing inequality.

What the increase in the variance does not tell us is how much of the variance (and its increase) is due to dispersion of earnings within institutions and how much of it is attributable to differences in average earnings across institutions. I investigate this question by decomposing the variance of earnings into within institution and between institution variances in earnings.[5] The within institution variance is:

$$(1) \qquad \sigma_w^2 = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{(J_i-1)}\sum_{i=1}^{J_i}(Y_{ij}-Y_i)^2$$

The between institution variance is:

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[5] See *Econometric Methods*, 3rd edition, by J. Johnston. McGraw-Hill, Inc. 1984. pg. 403 for a derivation of this decomposition.

(2) $$\sigma_B^2 = \frac{1}{N-1}\sum_{i=1}^{N}(Y_i - \bar{\bar{Y}})^2 - \frac{\sigma_w^2}{J}$$

Where Y_{ij} is the earnings of individual j at institution i, Y_i is average earnings at institution i, $\bar{\bar{Y}}$ is the overall average in earnings, J is the number of individuals at an institution in the sample, and N is the number of institutions in the sample.

Using this decomposition I find that within institution inequality is approximately twice as large as between institution inequality (see Table 2). In 1998, the within institution variance of the natural log of earnings was .103, while the between institution variance of earnings was .045. Additionally, both within institution and between institution variances increased from 1987 to 1998. The within institution earnings variance increase by .034 or by 49 percent, while the between institution variance increased by .01 or 29 percent, from 1987 to 1998. These results indicate that roughly two thirds of the variance of earnings is due to within institution differences in earnings, and approximately three quarters of the increase in earnings inequality is attributable to increases in within institution differences in earnings. So while these data confirm the increase in between institution earnings inequality found in earlier studies, it also suggest that there has been even greater increases in inequality than has been previously found.

As mentioned above, there has been a growing gap between the earnings of faculty at private versus public institutions. Additionally, Bell (2000, 2001) reports the difference between the earnings of faculty at research and doctoral institutions compared to those at comprehensive and liberal arts institutions grew over this period. These differences based on institutional control and type may account for a significant portion of the between institution variance in earnings. To account for these differences in earnings across institutional type I regress the natural log of earnings on dummy variables for public (versus private) control, Carnegie

classification (research, doctoral, comprehensive, and liberal arts) and the interaction of control and type.[6] The decomposition is then performed on the error terms from this regression. This essentially controls for the effects of institutional control and type. The remaining between institution differences represents differences in average earnings across institutions of similar control and Carnegie classification. In fact, the variance of between institution earnings declines by approximately one third or more when accounting for control and Carnegie classification. Nonetheless, the variance of between institution earnings, even conditional on control and type of institution, increased over this period (see Table 3). This indicates that average earnings across institutions, even within sectors of higher education, are becoming more unequal. This is consistent with the results of Ehrenberg (2003b) who found that the growing differences in endowment per student and appropriations per student across institutions was leading to growing disparities in average salaries for faculty.

Having confirmed that these data largely conform to existing studies of growing between institution earnings inequality, I now turn to examining the yet unexplored increasing within institution earnings inequality. Clearly an obvious factor in within institution differences in earning is differences in earnings across rank, tenure status, and experience. It may be the case that institutions are employing a different mix of faculty, in terms of rank, tenure status, and experience (even among full time tenure and tenure-track), or it may be the case that the returns to these characteristics have changed over time. Either case would lead to increasing variance of within institution earnings. I now incorporate controls for rank (full, associate, and assistant) and tenure status, as well as years of experience and seniority and their quadratic terms. The within institution variance of earnings is reduced by 40 percent (from .103 to .062) after controlling for

[6] Only the regression coefficients incorporating all individual regressors are shown, in Table 4. Other regression results are not shown but are available from the author upon request.

rank, tenure status, experience, and seniority. Additionally, the increase in the variance of within institution earnings decreased from .034 to .023, or by approximately one third. On the other hand, even conditional on rank, tenure, experience, and seniority within institution earnings inequality increased.

An alternative explanation for the growing within institution earning inequality may be the increasing diversity of the professoriate. As more women, minorities, and non-U.S. citizens join the faculty this may lead to growing earnings inequality if members of these groups are compensated in ways that are different from the majority group (white, male, U.S. citizens). Adding dummy variables for gender, race (black, Hispanic, Asian), and U.S. citizenship only marginally reduces the level of within institution variance of earnings, and has no real impact on the increase in earnings inequality.

An obvious candidate for explaining within institution differences in earnings are differences in field of specialization. There is anecdotal evidence that the returns to certain fields, in particular professional fields, such as business (see Bell (2001) and Mangan (2003)), are growing much more rapidly than are salaries in more traditional academic fields. Adding dummy variables for primary field of specialization (agricultural studies, fine arts, business, engineering, English, natural sciences, math and computer sciences, psychology, social sciences, education, languages, other and multidisciplinary studies) further reduces the within institution variance of earnings; however, accounting for field of specialization only marginally reduces the increase in within institution earnings inequality.

After accounting for the control and Carnegie classification of the institution, rank, tenure status, experience, seniority, gender, race, citizenship, and field of specialization of the faculty, I find that the variance of faculty earnings within these groups still increased. Within these groups

the variance of earnings increased by .024, or by 52 percent. An overwhelming majority (87 percent) of this increase in conditional variance is due to differences in earnings within institutions, while the remaining increase in the variance of earnings is attributable to differences in average earnings across institutions, conditional on the above individual and institutional attributes. This indicates that faculty in 1998 had greater divergence of earnings than observationally comparable faculty in 1987. A F-test for equality of overall variances in 1987 and 1998 reject the null at the 99 percent level (F-stat= 1.52, p-value=.0001); a F-test for equality of within institution variances rejects the null at the 99 percent level (F-stat=1.62; p-value=.0001); and, a F-test for equality of between institution variances rejects the null at the 90 percent level (F-stat=1.27; p-value=.08). All three tests are conditional on the above outlined individual and institutional characteristics.

Table 4 presents the results of the regression of the natural log of earnings on the above outlined individual and individual characteristics by year. There are a number of interesting changes in the returns over time. First, consistent with Bell (2000, 2001) the premium for working at a research university compared to the other Carnegie classifications has increased. For example, in 1987 faculty working at doctoral institutions had average earnings that were 12 percent lower than comparable research university faculty (exp(-.133)-1), comprehensive institution faculty had earnings that were 25 percent lower, and liberal arts college faculty had earnings that were 26 percent lower than research university faculty. By 1998, these differences were 16 percent, 29 percent, and 31 percent, respectively.

Another interesting result is the premium for working at a private research and doctoral institution compared to a public research or doctoral university. In addition, consistent with previous studies by Zoghi (2003), Alexander (2001), and Bell (2001), the private research

university premium increased from 1987 to 1998. It is also interesting to note that public, comprehensive institution faculty earn more on average than their private, comprehensive counterparts, but that this premium is declining.

There have also been significant changes in the returns to certain fields of specialization. For example, the premium for being a business professor has increased by approximately 8 percentage points from 1987 to 1998. Similarly the penalty for working in the education field has declined by 7 percent, while the penalty for working in the social sciences declined by approximately 5 percent.[7] On the other hand, the premium for working in computer science has declined from roughly 21 percent to 12 percent. Even conditional on these changing returns to individual and institutional characteristics, both the between institutions and within institution variance of earnings have increased.

Figures 2 through 5 illustrate this growing dispersion of both between and within institution earnings inequality. Figure 2 shows the distribution of the institutional average error terms from the regressions of Table 4. This graph illustrates the dispersion of institutional average earnings in 1987 and eleven years later in 1998. Clearly, the number of institutions with average earnings in both the extreme left and right tails has increased. In fact, as Figure 3 shows the number of institutions in the middle of the distribution of average earnings has declined while the number of institutions in the tails has increased by 135 percent or more.

Graphs of the distribution of within institution dispersion of earnings reveal a similar trend. Figure 4 shows the distribution of the standard deviation of within institution earnings. The number of institutions with standard deviation of earnings less than .2 has declined, while the number of institutions with standard deviation of earnings within institutions above .2 has

[7] The omitted field is All Other and Multidisciplinary, which is approximately the median field in all three years.

increased, even conditioning on rank, tenure status, experience, seniority, gender, race, citizenship, and field. Figure 5 clearly reflects the increasing percentage of institutions with high within institution dispersion of earnings.

There is casual and anecdotal evidence that there are increasing returns to research productivity, and also that top researchers are increasingly being lured from top-tiered departments and institutions to institutions further down the reputational hierarchy with lucrative salaries (Levine (2003)). This phenomenon would clearly increase within institution earnings inequality among institutions recruiting star faculty with handsome contracts. To test this hypothesis I incorporate controls for the number of career publications and publications in the past two years in refereed journals, non-refereed journals, chapters in books, books, presentations, and other research output (such as patents or computer software products). Also, I present separate results by control and Carnegie classification as one would expect that within institution differences in earnings would be more pronounced at research oriented institutions. This is in fact the case (see Table 5). The greatest variance of earnings and the greatest within institution variance of earnings are found at private research and doctoral institutions. Additionally, the greatest increase in both the variance of earnings and the variance of within institution earnings occurred at private research institutions. Although private institutions led the way in increasing earnings inequality, all four-year sectors of higher education experienced increasing earnings inequality and increasing within institution earnings inequality. The largest increase in earnings inequality occurred at private research and doctoral institutions (increase in variance of .047), followed by private comprehensive institutions (.039), public research and doctoral institutions (.022), liberal arts colleges (.021), and public comprehensive institutions (.013). The largest increase in within institution earnings inequality also occurred at private

research and doctoral universities (increase in within institution variance of .047), followed by private comprehensive institutions (.031), public comprehensive institutions (.019), public research and doctoral universities (.015), and then liberal arts colleges (.009). Despite controlling for the quantity of various forms of research output there are increasing within institution variances of earnings in all sectors. These separate sector results also reveal that there are greater variances of earnings in the private sector than the public sector, conditional on Carnegie classification, and that there are greater within institution variances of earnings in the private sector, within Carnegie classifications, as well.

IV. Conclusion

The results outlined above indicate that overall earnings inequality among college and university faculty increased from the late 1980s to the late 1990s. This increase in inequality is the product of both increases in between institution earnings inequality, as documented elsewhere, but to an even larger extent the increase in earnings inequality among faculty is attributable to increases in within institution earnings inequality, even conditional upon rank, tenure status, experience, seniority, gender, race, citizenship, and field of specialization. In short, the dispersion of earnings among observationally equivalent faculty has increased. The dispersion of earnings and the increase in the dispersion of earnings are greatest at private research and doctoral universities, followed by private comprehensive institutions; however, every sector of higher education, both public and private, research and teaching oriented has experienced an increase in earnings inequality among its faculty.

There are a number of possible underlying sources for this increase in within institution variance of earnings. First, it may simply be a case of earnings responding to the increasing dispersion of opportunity costs. As salaries in alternative sectors of the economy become more disperse it may be the case that the opportunity costs of faculty have become more disperse and salaries in higher education have been forced to reflect these trends.

An alternative explanation for the growing inequality of faculty salaries may be what Frank and Cook (1995) call the "winner-take-all" phenomenon where individuals with outstanding characteristics reap a disproportionate share of the rewards. Although I attempt to account for the quantity of research output (assuming star status in higher education is defined by research output) this may not adequately capture one's research status as quality is at least as important as quantity. While superstar researchers have always been highly valued in higher education, it may be the case that technological advancements have reduced the benefits of physical proximity to other star researchers. As a result, lower ranked institutions may now be able to more easily raid faculty from top-tiered institutions with lucrative salaries. In fact, the New York Times Magazine recently ran a story on how New York University lured the Nobel Prize winning economist, Thomas Sargent, from Stanford University. In the same story, the president of NYU agreed to use the resources of the university to attract Dr. Sargent, but reportedly warned the existing faculty not to complain about the resulting disparity in salaries.[8] Even if star faculty do not actually move, the offer itself may prompt the faculty member's current institution to respond with a counter-offer (see Lazear (1986)).

While the above discussion of the rising returns to research output may help to explain the increasing variance of faculty salaries at research oriented institutions it does not say much

[8] Levine, Mark. "Ivy Envy." *New York Times Magazine*. June 8, 2003, p. 75.

about why earnings inequality is increasing even at comprehensive institutions and liberal arts colleges. An additional explanation for rising inequality throughout all sectors of higher education may be the increased "corporatization" of academia; that is the application of corporate business models and practices to academic institutions. Evidence of this trend is the rising numbers of professional management (administrators) and the increased use of enrollment management personnel and software to price discriminate across customers. If the corporate sector relies increasingly on assessment and evaluation tools to differentiate among its employees and to vary their compensation, so too may higher education. The growing variance of earnings throughout higher education may reflect, in part, a changing culture on campus toward a more business oriented approach to assessment and compensation.

The absence of a smoking-gun explanation for the increasing variance of faculty earnings, both overall and within institutions, parallels the lack of a definitive explanation for the full increase in the variance of earnings in the broader labor market. The possible explanations for the rising variance of overall and within institution faculty earnings outlined above warrant additional investigation.

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Table 1. Benchmarking the NSOPF to AAUP salary data
Average salary by rank and institutional type

Research/Doctoral Universities

	Professor			Associate			Assistant		
	AAUP	NSOPF		AAUP	NSOPF		AAUP	NSOPF	
1987	52950	53202	0.5%	38040	38171	0.3%	32050	32808	2.4%
1992	66780	67148	0.6%	47220	48196	2.1%	40110	39845	-0.7%
1998	83207	85526	2.8%	57924	58500	1.0%	48530	48165	-0.8%

Comprehensive Institutions

	Professor			Associate			Assistant		
	AAUP	NSOPF		AAUP	NSOPF		AAUP	NSOPF	
1987	43940	44562	1.4%	34690	34197	-1.4%	28460	28894	1.5%
1992	54760	53831	-1.7%	43680	42773	-2.1%	36160	35325	-2.3%
1998	64770	63721	-1.6%	51394	52051	1.3%	42131	40716	-3.4%

Liberal Arts Colleges

	Professor			Associate			Assistant		
	AAUP	NSOPF		AAUP	NSOPF		AAUP	NSOPF	
1987	37890	41411	9.3%	30410	31426	3.3%	25410	26038	2.5%
1992	48390	49365	2.0%	38900	38386	-1.3%	32420	31748	-2.1%
1998	58984	59296	0.5%	46396	47275	1.9%	38599	39152	1.4%

Notes:
The NSOPF data are for calendar years 1987, 1992, and 1998. The AAUP data are for academic year 1987-88, 1992-93, and 1998-99.

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Table 2. Basic Annual Salary

	1987 Earnings	1992 Earnings		1998 Earnings			
Mean	$63,271	$62,327	-1.49%	$68,027	7.52%		
Median	$59,594	$58,081	-2.54%	$63,043	5.79%		
Deciles							
10	$39,938	$39,141		$41,304			
20	$46,022	$44,192		$45,652			
30	$50,546	$49,242		$52,174			
40	$55,248	$53,030		$56,522			
50	$59,594	$58,081		$63,043			
60	$64,743	$63,131		$68,478			
70	$70,203	$69,444		$76,087			
80	$78,003	$77,020		$86,957			
90	$90,484	$89,646		$103,261			
10/50 ratio	0.67	0.67		0.66			
90/50 ratio	1.52	1.54		1.64			
90/10 ratio	2.27	2.29		2.50			
variance of natural log of earnings	0.105	0.116		0.147		change 0.042	percentage change 40%
Variance Components							
Within Inst	0.069	0.078		0.103		0.034	49%
Between Inst	0.035	0.038		0.045		0.010	29%

Figure 1. Percentage Change in Real Salaries by Decile

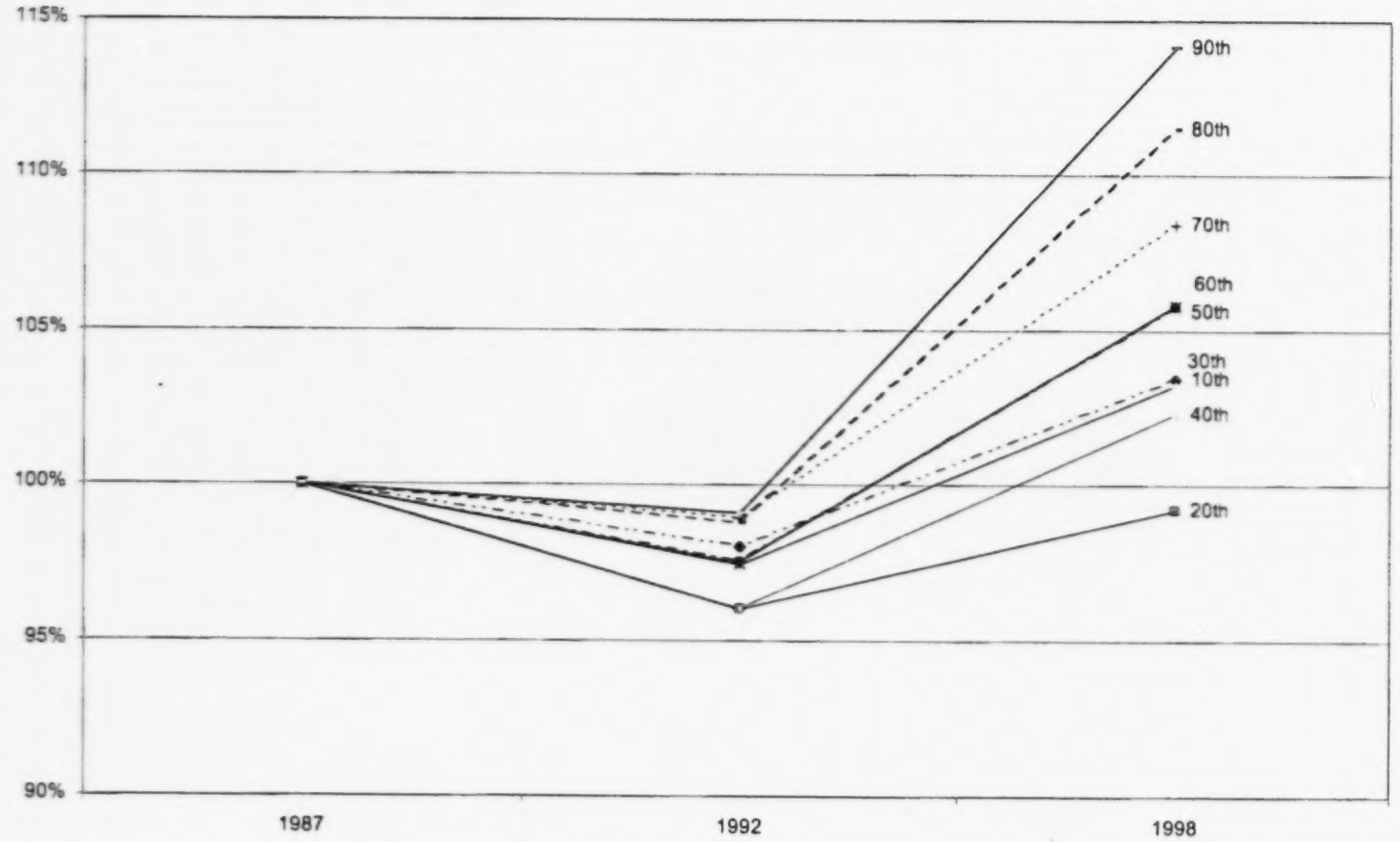

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Table 3. Between and Within Institution Variances
Conditional on institutional and individual characteristics

		1987	1992	1998	change	percentage change
Control and Carnegie Classification	Total	0.091	0.101	0.128	0.037	41%
	Within Inst	0.069	0.078	0.103	0.034	49%
	Between Inst	0.022	0.023	0.025	0.003	14%
Rank, Tenure, Experience, and Seniority	Total	0.052	0.061	0.077	0.025	48%
	Within Inst	0.039	0.044	0.062	0.023	59%
	Between Inst	0.013	0.017	0.016	0.003	23%
Gender, Race, and Citizenship	Total	0.051	0.060	0.076	0.025	49%
	Within Inst	0.038	0.043	0.061	0.023	61%
	Between Inst	0.013	0.017	0.016	0.003	23%
Field of Specialization	Total	0.046	0.054	0.070	0.024	52%
	Within Inst	0.034	0.038	0.055	0.021	62%
	Between Inst	0.012	0.016	0.015	0.003	27%

Note:
Each subsequent regression includes all of the preceding explanatory variables and then incorporates the additional regressors specified.

Table 4
Regression Results by Year
Dependent variable is the natural log of basic salary

	1987		1992		1998			1987		1992		1998	
Constant	10.912	***	10.924	***	10.855	***	Agriculture	0.010	***	0.002		0.005	
	(0.003)		(0.004)		(0.004)			(0.003)		(0.003)		(0.004)	
Doctoral University	-0.133	***	-0.190	***	-0.179	***	Fine Arts	-0.169	***	-0.155	***	-0.165	***
	(0.003)		(0.003)		(0.006)			(0.002)		(0.002)		(0.003)	
Comprehensive University	-0.293	***	-0.345	***	-0.345	***	Business	0.083	***	0.124	***	0.163	***
	(0.002)		(0.002)		(0.003)			(0.002)		(0.002)		(0.003)	
Liberal Arts College	-0.299	***	-0.391	***	-0.373	***	Engineering	0.093	***	0.137	***	0.079	***
	(0.002)		(0.002)		(0.003)			(0.002)		(0.003)		(0.003)	
Public*Research University	-0.101	***	-0.157	***	-0.136	***	English	-0.098	***	-0.095	***	-0.116	***
	(0.002)		(0.003)		(0.002)			(0.002)		(0.002)		(0.003)	
Public*Doctoral University	-0.094	***	-0.088	***	-0.075	***	Natural Sciences	-0.018	***	-0.013	***	0.002	
	(0.003)		(0.003)		(0.006)			(0.002)		(0.002)		(0.002)	
Public*Comprehensive University	0.077	***	0.030	***	0.041	***	Mathematics	-0.054	***	-0.049	***	-0.020	***
	(0.002)		(0.002)		(0.003)			(0.003)		(0.003)		(0.003)	
Associate Professor	0.111	***	0.124	***	0.096	***	Psychology	-0.035	***	-0.037	***	-0.034	***
	(0.002)		(0.002)		(0.002)			(0.003)		(0.003)		(0.003)	
Full Professor	0.358	***	0.346	***	0.342	***	Social Sciences	-0.053	***	-0.028	***	0.002	
	(0.002)		(0.002)		(0.003)			(0.002)		(0.002)		(0.002)	
Tenured	0.079	***	0.074	***	0.066	***	Computer Sciences	0.189	***	0.076	***	0.109	***
	(0.002)		(0.002)		(0.003)			(0.003)		(0.004)		(0.004)	
Years of Experience	0.009	***	0.005	***	0.011	***	Education	-0.113	***	-0.046	***	-0.040	***
	(0.0002)		(0.0002)		(0.0003)			(0.002)		(0.002)		(0.003)	
Years of Experience Squared	-0.0001	***	0.00004	***	-0.00002	***	Modern Languages	-0.118	***	-0.115	***	-0.105	***
	(0.00001)		(0.00001)		(0.00001)			(0.003)		(0.003)		(0.004)	
Years of Seniority	-0.008	***	-0.005	***	-0.00001								
	(0.0002)		(0.0002)		(0.0003)								
Years of Seniority Squared	0.0002	***	0.0001	***	-0.0001	***	R-squared	0.566		0.533		0.524	
	(0.00001)		(0.00001)		(0.000001)								
Male	0.044	***	0.055	***	0.033	***							
	(0.001)		(0.001)		(0.002)								
Black	0.004		-0.0003		-0.023	***							
	(0.003)		(0.002)		(0.003)								
Hispanic	-0.040	***	0.015	***	-0.028	***							
	(0.003)		(0.001)		(0.004)								
Asian	0.026	***	0.007	***	0.040	***							
	(0.002)		(0.002)		(0.003)								
US Citizen	-0.043	***	-0.008		0.0090	***							
	(0.002)		(0.002)		(0.002)								

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Figure 2. Distribution of Average Institutional Earnings

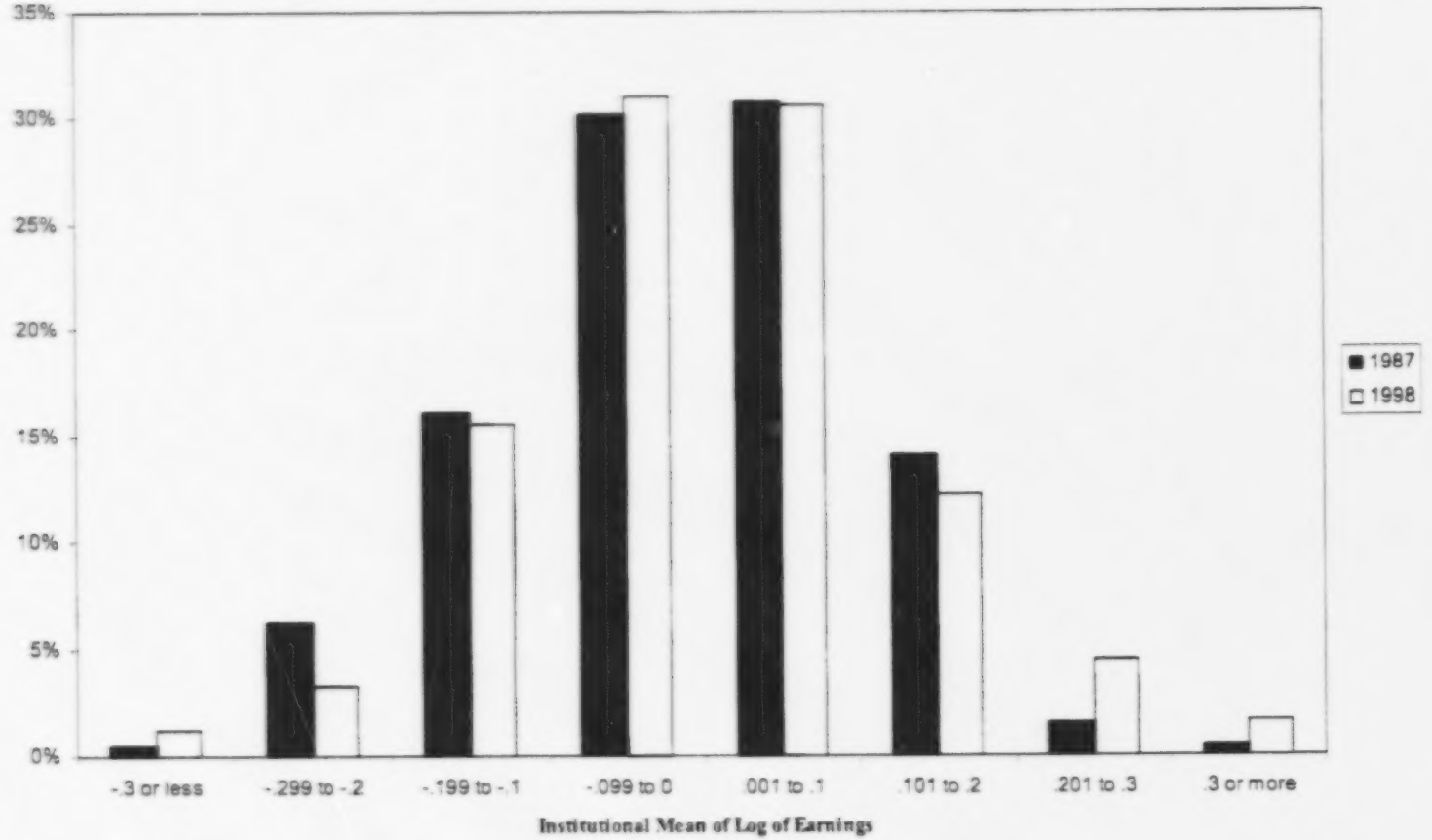

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Figure 3. Changes in the Distribution of Average Institutional Earnings
Between 1987 and 1998

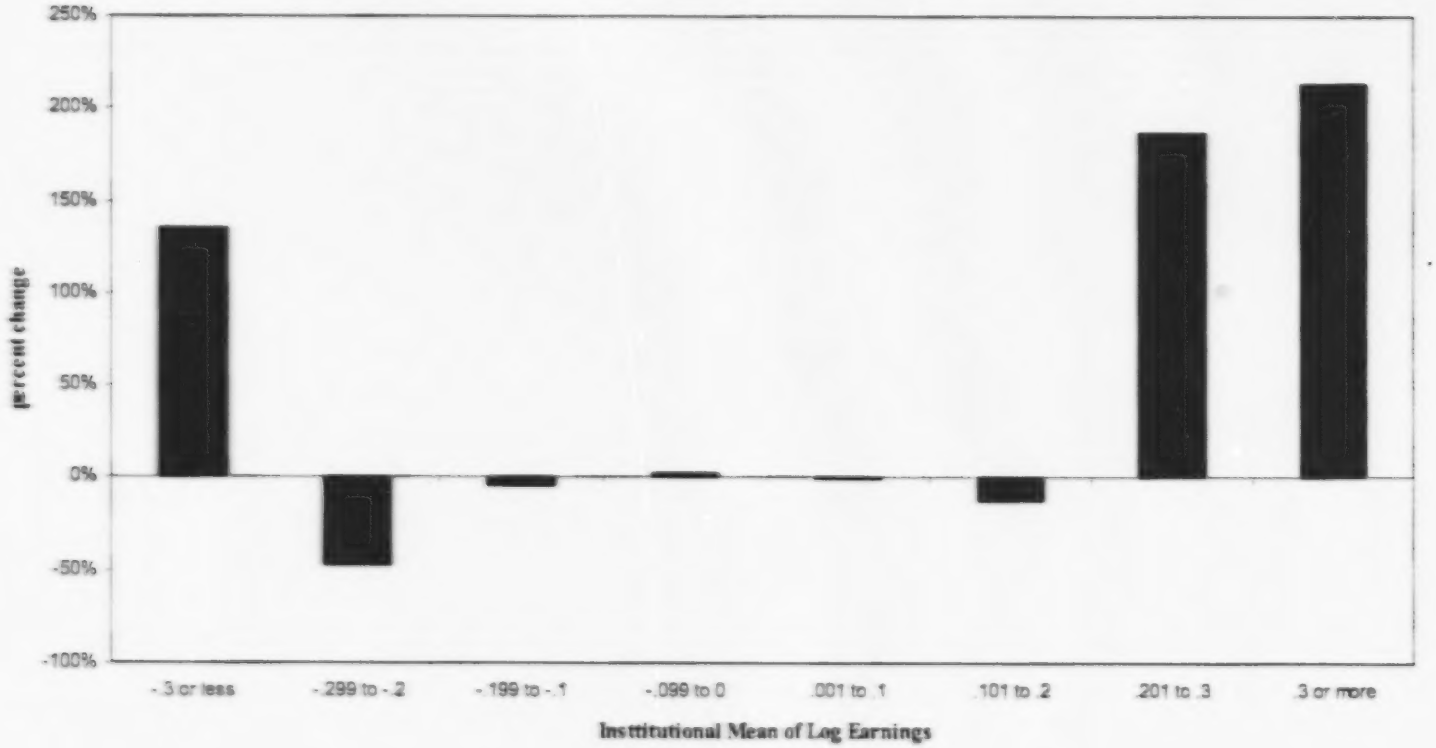

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Figure 4. Distribution of Standard Deviations of Within Institution Earnings

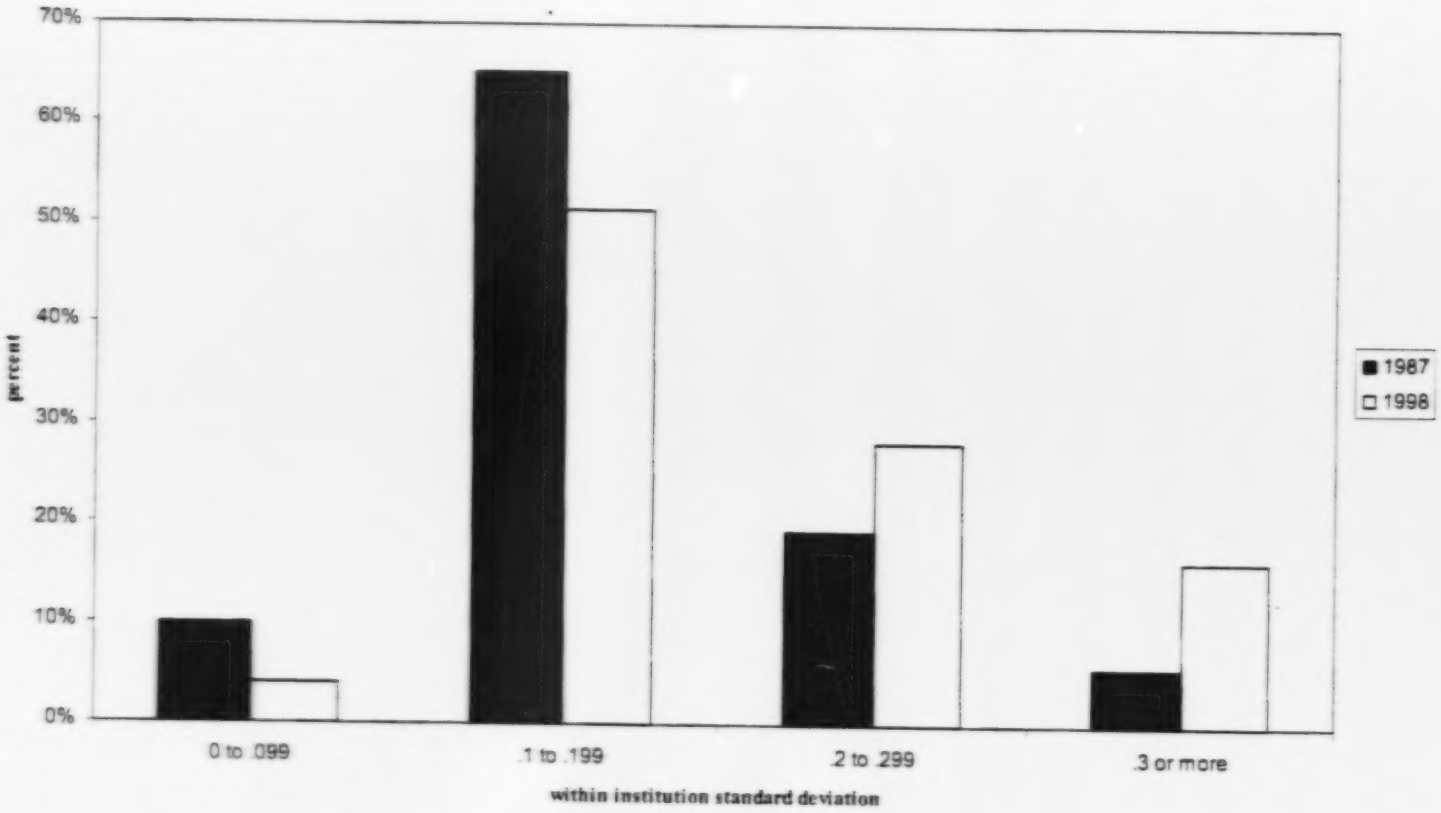

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Figure 5. Changes in the Distribution of Standard Deviation of Within Institution Earnings

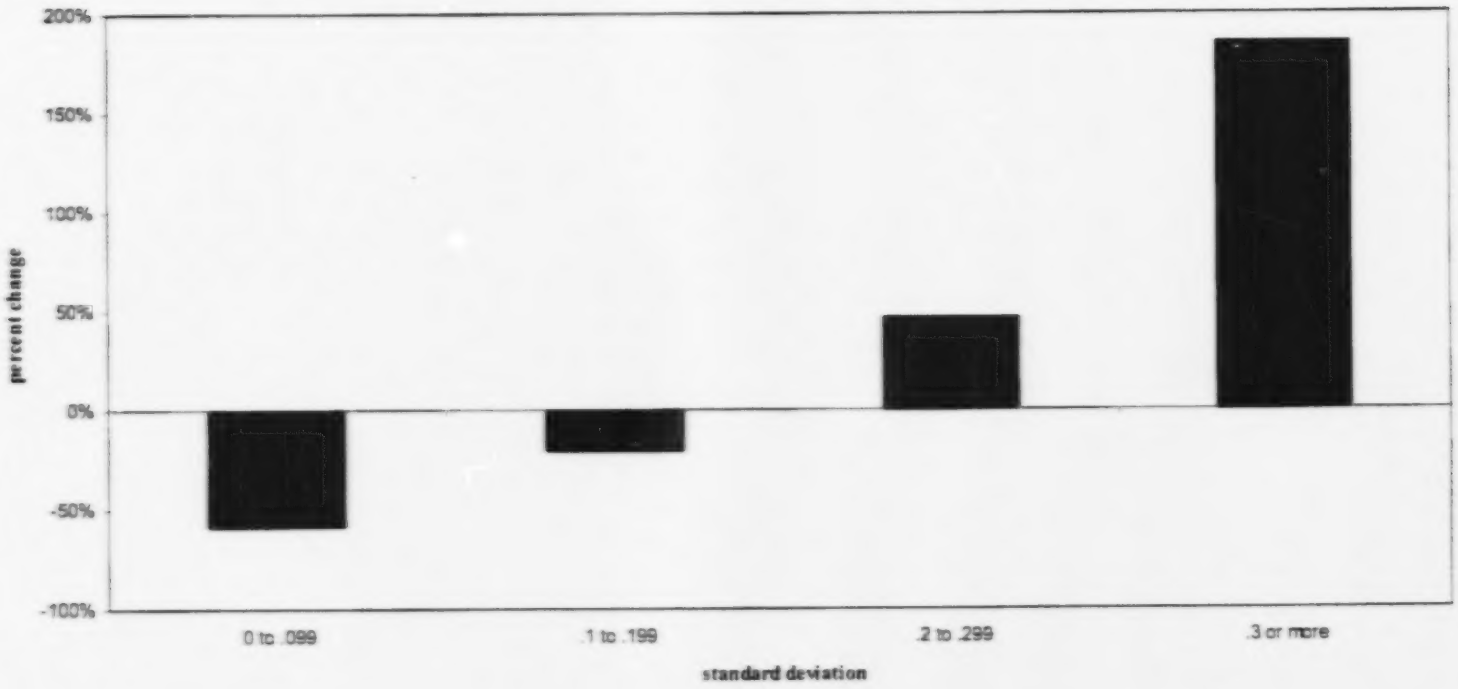

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Table 5. Variance Decomposition by Institutional Type and Control

	1987	1992	1998	change	percentag change
Public Research/Doctoral Universities					
Total	0.045	0.050	0.067	0.022	49%
Within Institution	0.039	0.039	0.054	0.015	38%
Between Institutions	0.006	0.011	0.013	0.007	117%
Private Research/Doctoral Universities					
Total	0.060	0.048	0.107	0.047	78%
Within Institution	0.046	0.039	0.093	0.047	102%
Between Institutions	0.014	0.009	0.014	0.000	0%
Public Comprehensive Institutions					
Total	0.033	0.047	0.046	0.013	39%
Within Institution	0.018	0.034	0.037	0.019	106%
Between Institutions	0.015	0.013	0.009	-0.006	-40%
Private Comprehensive Institutions					
Total	0.048	0.060	0.087	0.039	81%
Within Institution	0.032	0.035	0.063	0.031	97%
Between Institutions	0.016	0.025	0.024	0.008	50%
Baccalaureate					
Total	0.058	0.071	0.079	0.021	36%
Within Institution	0.036	0.034	0.045	0.009	25%
Between Institutions	0.022	0.037	0.034	0.012	55%

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